Gut microbiota and attention deficit hyperactivity disorder: new perspectives for a challenging condition

María Carmen Cenit, Isabel Campillo Nuevo, Pilar Codoñer-Franch, Timothy G. Dinan, Yolanda Sanz


Abstract

A bidirectional communication between the gut and the brain (gut–brain axis) is well recognised with the gut microbiota viewed as a key regulator of this cross-talk. Currently, a body of preclinical and to a lesser extent epidemiological evidence supports the notion that host–microbe interactions play a key role in brain development and function and in the aetiology of neurodevelopmental disorders. Early life events and shifts away from traditional lifestyles are known to impact gut microbiota composition and function and, thereby, may increase the risk of developing neurodevelopmental disorders. Attention deficit hyperactivity disorder (ADHD) is nowadays the most prevalent neurodevelopmental disorder. Despite many years of research, its aetiology is unclear and its diagnosis and treatment are still challenging. Different factors reported to be associated with the risk of developing ADHD and/or linked to different ADHD manifestations have also been linked to shifts in gut microbiota composition, suggesting a link between the microbiota and the disorder. Evidence from preliminary human studies also suggests that dietary components that modulate gut microbiota may also influence ADHD development or symptoms, although further studies are warranted to confirm this hypothesis. Here, we firstly review the potential mechanisms by which the gut microbiota may regulate the brain–gut axis and influence behaviour and neurodevelopmental disorders. Secondly, we discuss the current knowledge about the different factors and dietary components reported to be associated with the risk of developing ADHD or its manifestations and with shifts in gut microbiota composition. Finally, we briefly highlight the need to progress our understanding regarding the role of the gut microbiota in ADHD, since this could open new avenues for early intervention and improved management of the disease.